

Radiation Testing for Nuclear Inspection Systems

Final CRADA Report

Exdperimental Operations and Facilities Division

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prepared by
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Experimental Operations and Facilities Division, Argonne National Laboratory

Participants: Vega Wave Systems, Inc.

March 12, 2020

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Non Proprietary Final CRADA Report

For the Office of Scientific and Technical Information (OSTI)

CRADA Number: A18145

CRADA Title: Radiation Testing for Nuclear Inspection Systems

CRADA Start Date 8/16/2018 – **End Date** 12/31/2019

DOE Program or Other Government Support

Program office: DOE NE GAIN

Program manager name: Dave Bates

Program manager phone or email: dbates@alleghenyst.com

Participant(s)

Participant 1 name: Vega Wave Systems Inc.

Complete address: 1275 W Roosevelt Rd., Ste 104, West Chicago, IL 60185

Participant 2 name: Click or tap here to enter text.

Complete address: Click or tap here to enter text.

Participant 3 name: Click or tap here to enter text.

Complete address: Click or tap here to enter text.

Argonne National Laboratory

Argonne PI(s): Sergey Chemerisov

Funding Table

To add rows, right-click in bottom row and select "Insert" "rows above".

	Planned Funding	Actual Funding	In-Kind
Government	\$130,000	\$130,000	
Enter Participant 1 here	\$32,500	\$	\$32,500
Enter Participant 2 here	\$	\$	\$
Enter Participant 3 here	\$	\$	\$
Total	\$162,500	\$130,000	\$32,500

Nature of Work

Describe the research (summary of Scope of Work and principal objectives of the CRADA):

Higher-radiation hardened video cameras are needed in the operation and remote handling of equipment in nuclear reactor inspection and refueling applications. Vega Wave Systems has developed a radiation-hardened vision system for Nuclear Energy applications. The high-radiation hardness testing of this vision system was conducted using the Argonne Low-Energy Accelerator Facility (LEAF).

DOE mission area(s):

Energy and Environmental Science and Technology

Choose an item.

Choose an item.

Conclusions drawn from this CRADA; include any major accomplishments:

Argonne researchers have tested several prototype test units developed by Vega Wave Systems Inc. using 3MeV x-rays generated by the Van de Graaff to assess radiation tolerance of the system and demonstrated their operability in extremely high radiation field.

The results of the irradiation tests clearly show that the camera exhibited some non-fatal radiation effects from ionized contaminants. Once the contamination was mitigated, the camera showed no effects of radiation at dose rates up to 10 kGy/hr and total dose rates of 525 kGy (at 10 kGy/hr). The results are extremely encouraging, and Vega Wave Systems is planning further irradiations to confirm the radiation hardness of the system up to higher dose rates. Commercial reliability protocols for Mean Time To Failure require testing of 11 to 24 systems. In effect, these results show that the Enduray Vision System developed by Vega Wave Systems is >10X more radiation-hard than the best available commercial competitor in terms of dose rate, and can easily sustain radiation dose rates and total doses seen in the most extreme commercial applications in the nuclear energy industry.

Technology Transfer-Intellectual Property

Argonne National Laboratory background IP:

None

Participant(s) background IP:

Click or tap here to enter text.

Identify any new Subject Inventions as a result of this CRADA:

None

Summary of technology transfer benefits to industry and, if applicable, path forward/anticipated next steps towards commercialization:

Click or tap here to enter text.

Other information/results (papers, inventions, software, etc.):

Final report: Kevin Quigley, Kenneth Wesolowski, James Bailey, Sergey Chemerisov, Tony Moretti, Joseph Salzberg, David Jenkins, and Alan Sugg, "Photon Irradiation Effects on the Enduray Vision System for Nuclear Inspections", ANL technical report ANL-20/09, January 2020.

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